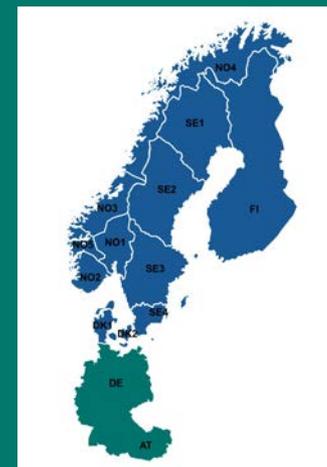
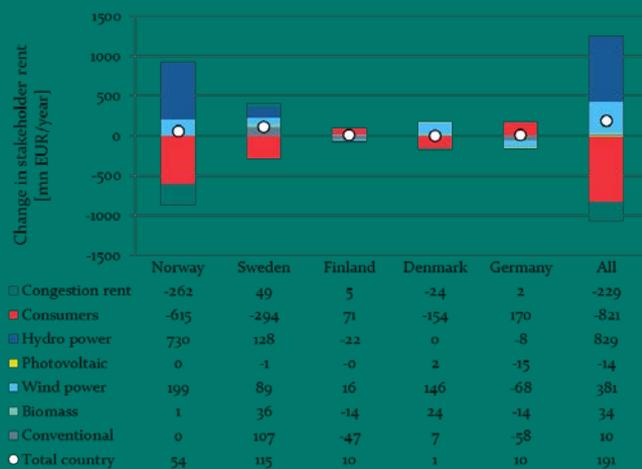


Distributional Effects of System Integration and Qualitative Discussion of Implications for Stakeholders



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Distributional Effects of System Integration and Qualitative Discussion of Implications for Stakeholders

Main finding #1

- System integration yields positive total benefits in the energy-only market
- System integration results in an uneven distribution of benefits
- Distributional effects can be several times higher for consumers & producers
- Development of additional wind and hydro power in Norway and Sweden:
 - Strong depression of prices (merit order effect)
 - Interconnectors are mainly used for increased export from the Nordics to Germany

Distributional Effects of System Integration and Qualitative Discussion of Implications for Stakeholders

Main finding #2

- Cross-border allocation of network investment costs could provide incentives for countries without direct benefits
- Challenge to decide on
 - Mechanism for cost allocation (ex-ante negotiations / ex-post allocation)
 - Projects of cross-border significance or national network enforcement
- National electricity prices and tariffs vary by industry versus small consumer
 - Energy-intensive industry benefits from renewables and weak interconnection
 - Current price composition benefits energy-intensive industry

Distributional effects with additional system integration

1. Additional interconnection results in benefits on national level
 - Welfare effects (consumer, producer and network rents)
 - Reduction in national power plant capacity

2. Convergence in market prices causes distributional effects
 - Distributional effects are substantially higher than national benefits
 - In the Nordics producers gain and consumers lose and vice versa in Germany

- National benefits of integration increase from 70 to 238 mn EUR/year

Moderate RES scenario

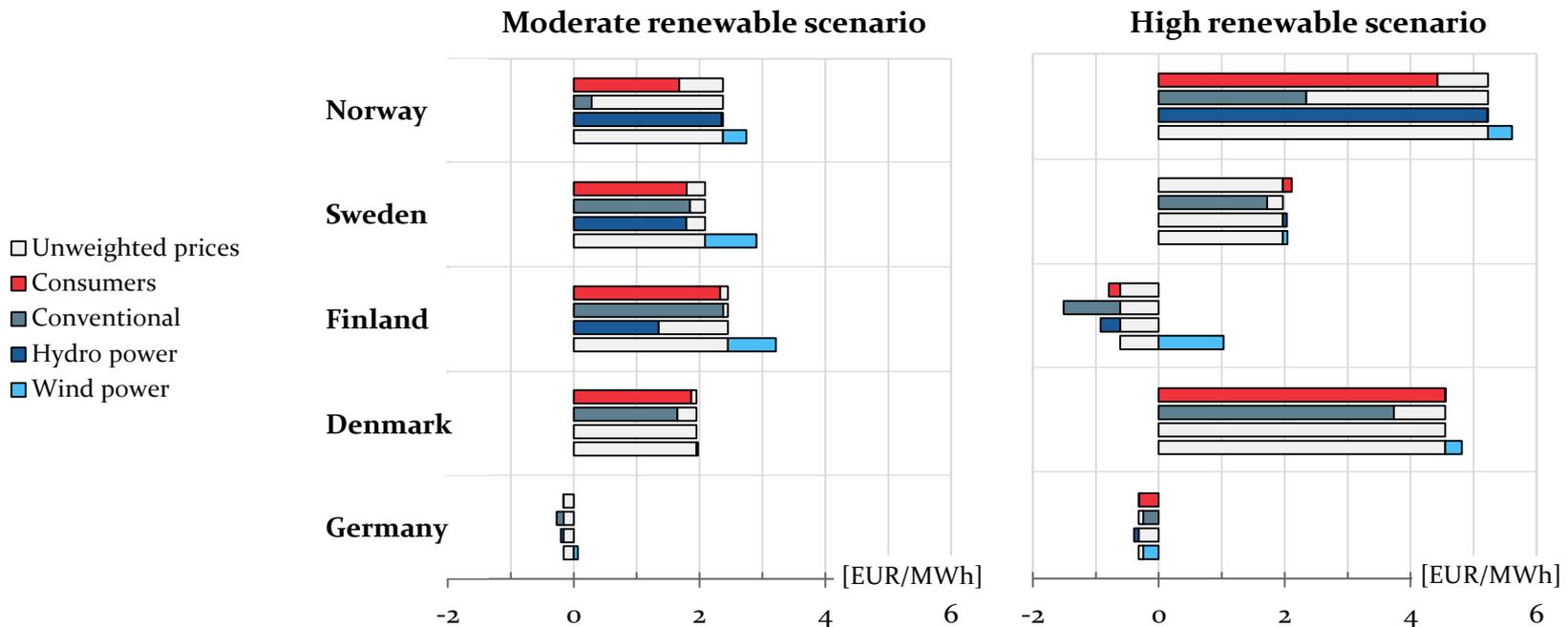
- Norway, Sweden and Germany benefit from trade gains in the energy-only market

High RES scenario

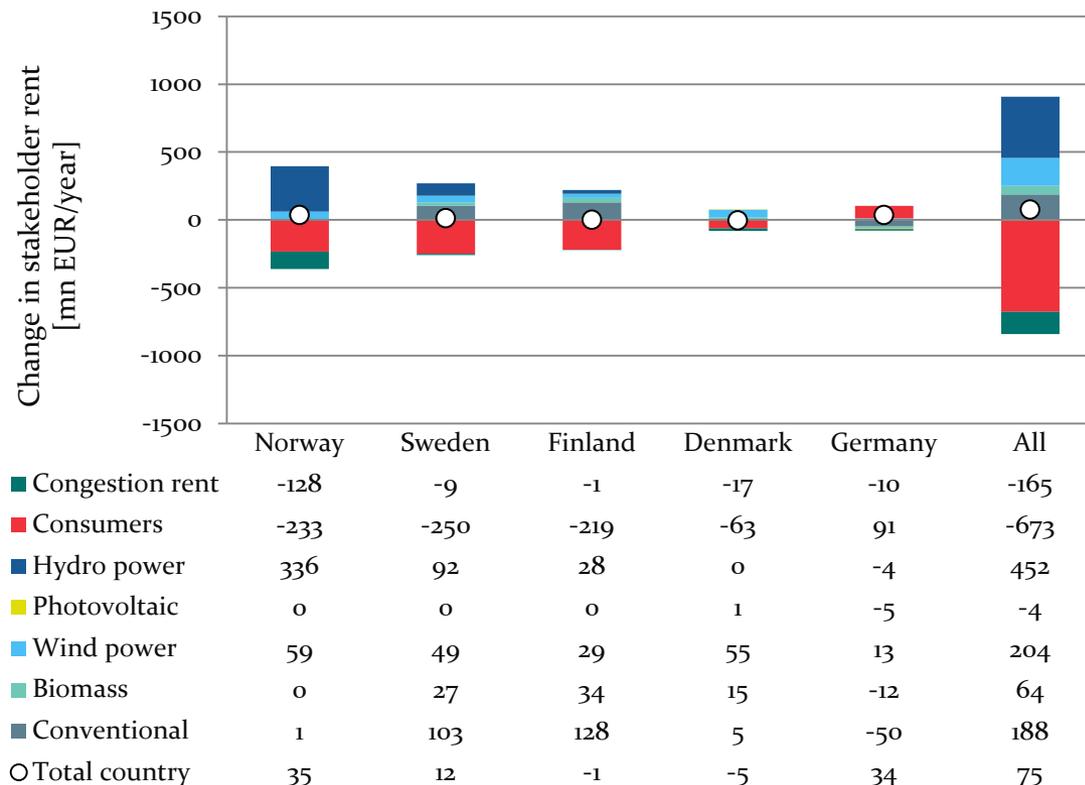
- Norway and Sweden benefit from trade gains in the energy-only market
- Finland and Germany mainly by lower conventional capacity (capital and fixed costs)
- Denmark as transit country does not benefit

		Norway	Sweden	Finland	Denmark	Germany	All
Moderate RES	[mn EUR]	+35	+14	+12	-7	+18	+70
High RES	[mn EUR]	+53	+56	+69	0	+59	+238

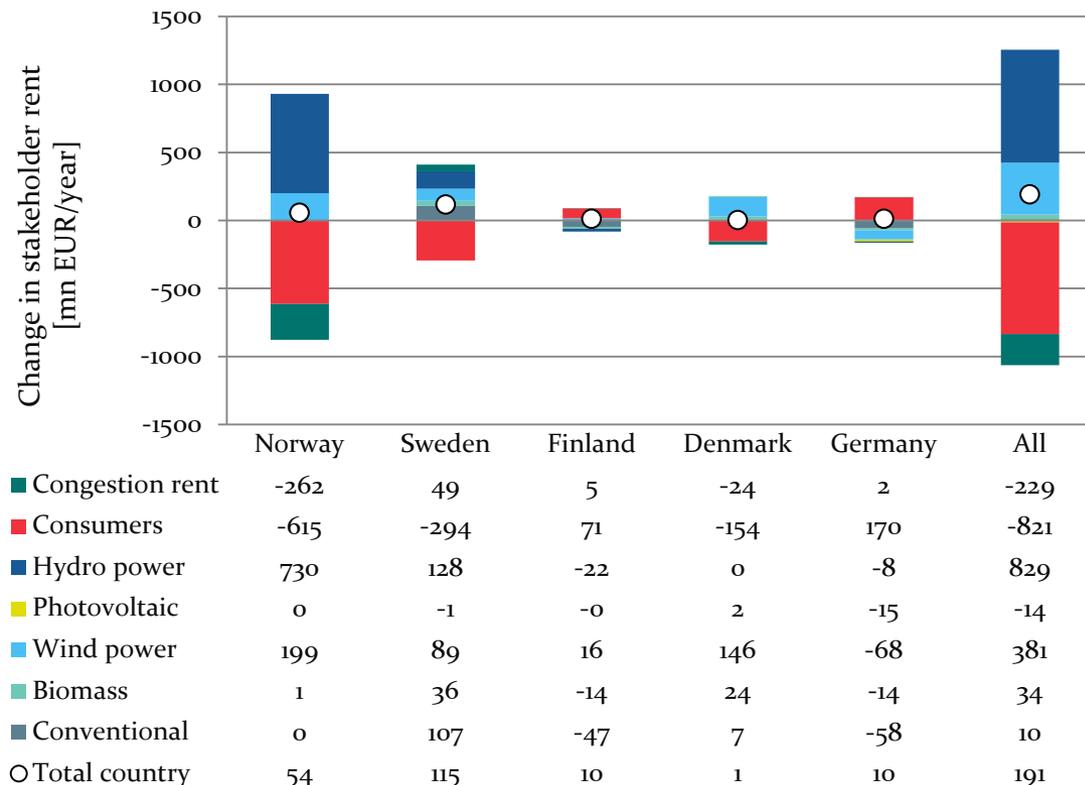
- Price effect of integration higher for Norway and Denmark in high RES
- Finland sees reverse effect (lower prices of integration) for high RES
- Wind power profits more than average



- Strongest effect in the Nordic countries (200-350 mn EUR)
- Wind power producers gain in all countries
- Effects in Germany are somewhat limited



- Same effects in high RES scenario, except for Finland
- Redistribution increases primarily in Norway, Sweden and Denmark
- Additional exports from the Nordics mitigates merit order effect



Exposure of residential consumers to price changes

- Electricity demand of small consumers varies between countries
- Correlation of demand and electricity prices
- Main difference in price composition: taxes and levies

		Norway	Sweden	Finland	Denmark	Germany
	Year	2012	2012	2013	2012	2013
Residential demand	[GWh]	38,573	35,086	21,510	14,285	138,400
Average consumption	[kWh/capita]	7,736	3,672	3,946	2,560	1,719

		Norway	Sweden	Finland	Denmark	Germany
Energy and supply	[cent/kWh]	5.22	5.65	6.03	4.83	8.66
Network tariff	[cent/kWh]	7.57	7.56	4.84	7.66	6.23
Taxes and levies	[cent/kWh]	4.99	7.25	4.72	16.86	14.32
Total	[cent/kWh]	17.78	20.46	15.59	29.35	29.21

Exposure of large industrial consumers to price changes

- Energy price is significant component
- Recent price development: Lower electricity prices in energy-only market in Germany due to renewables and merit order effect
- Network costs and taxes very modest compared to small industrial, services or residential

		Norway	Sweden	Finland	Denmark	Germany
Energy and supply	[cent/kWh]	3.57	4.49	4.71	3.93	4.91
Network costs	[cent/kWh]	0.60	0.74	0.57	3.83	1.30
Taxes and levies	[cent/kWh]	0.14	0.01	0.70	0.90	3.50 ^[1]
Total	[cent/kWh]	5.61	5.29	5.98	8.66	9.71

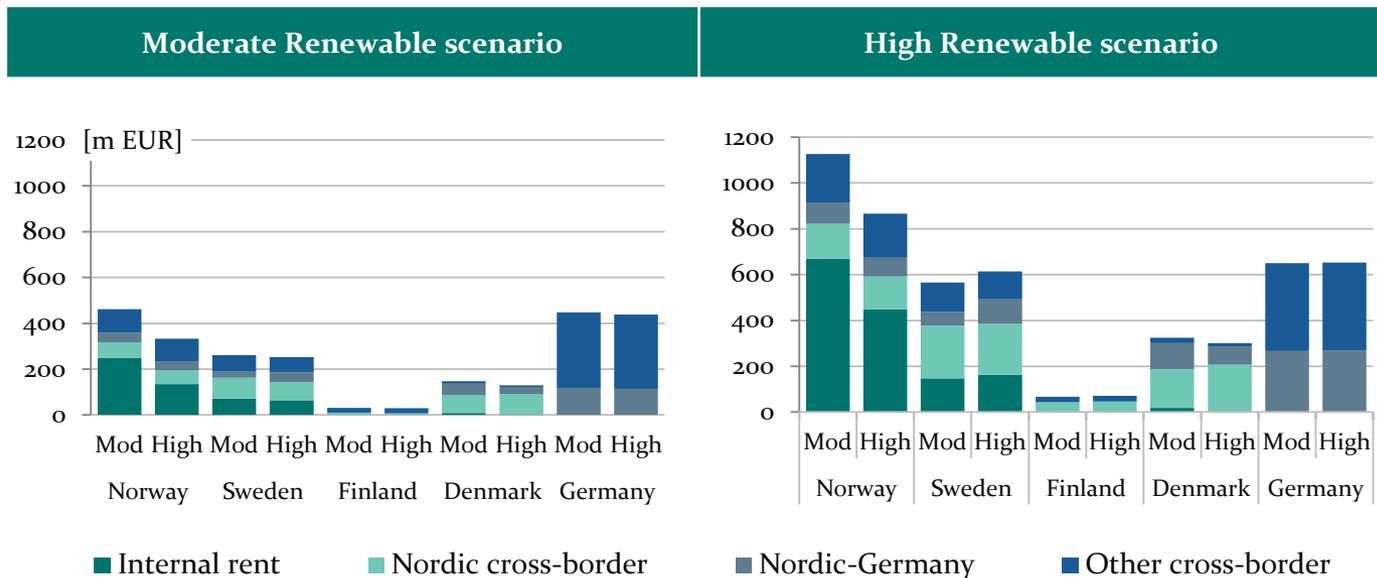
- Some sectors in the Nordic countries especially electricity-intensive
 - Pulp and paper (Sweden, Finland), basic metals (Norway, Sweden, Finland)
 - Sectors do not stick out in terms of employment and turnover
 - Mitigation options, although somewhat limited

[1] Additional exemptions exist for companies exposed to international competition. For individual firms, taxes and levies can be significantly lower.

Challenge: Uneven allocation of benefits from system integration

National-strategic incentives for integration

- Network costs are primarily recovered by national tariffs
- Congestion rents on interconnectors can recover some costs
- Additional congestion rents do not pay for interconnectors



National and regional perspectives on network development

Cost-benefit allocation of network investment

- Inter-TSO compensation mechanism does not address long run marginal costs (ex-post calculation from market results)

Current investments

- Bilateral projects between TSOs (Nord.Link, NSN)
- Projects of Common Interest for trans-European energy infrastructure
 - Identified by contribution to the integration of national electricity system and system benefits (security of supply, competition and RES integration)
 - Benefit from accelerated planning, increased visibility, financial support from Connecting Europe Facility
 - Currently four PCI projects in Nordic-German region (DE - DK, DE - NO)

Summary

- System integration yields positive total benefits in the energy-only market
- System integration results in an uneven distribution of benefits
- Distributional effects can be several times higher for consumers & producers
- Cross-border allocation of network investment costs could provide incentives for countries without direct benefits
- National electricity prices and tariffs vary by consumer groups, i.e. large and small industries and residential

Vielen Dank für Ihre Aufmerksamkeit.



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Backup: Congestion management and price zones

Different scenarios for splitting the German-Austrian bidding zone



Backup: Congestion management and price zones

- Many uncertain parameters
 - Number and size of bidding zones
 - Progress in internal (north-south) line enforcement in Germany
 - Inter-zonal NTCs vary on hourly basis
- Zonal electricity prices deviate in hours of binding trade constraints
- Effect on price/scarcity signals at borders and change in trade flow between German and the Nordic bidding zones



- Implications on benefits and distributional results
- Price zones alter the incentive for additional cross-border lines